

# 2014 Year of the **LEPIDOPTERA**

**Pre-requisite Test Presentation**

**By Brian Bockhahn**



**Why didn't the butterfly go to the dance?**

**Because it was a moth ball!**



# Just what are they???

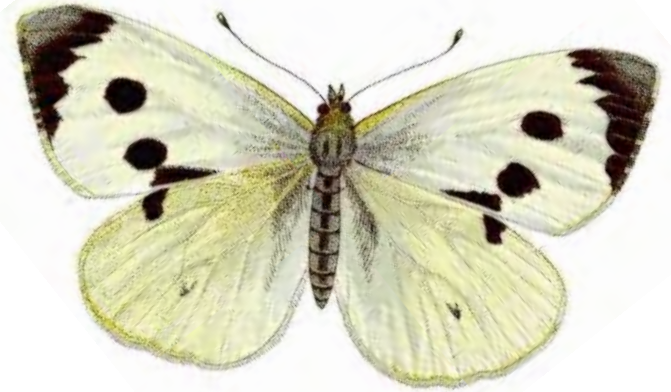
Animal Kingdom

Arthropod Phylum

Insect Class

**Lepidoptera** Order

Butterflies and Moths



**Lepido: Scale**  
**ptera: wing**

# How many are there in NC?



**There are 17  
times as many  
moths as there  
are butterflies!**



**3,011+ moth  
species!**

**176 butterfly  
species!**



# Why are leps important???

- Pollinate flowers
- Indicator species
- Enjoyable to watch
- Link in food chain
- Challenging to identify different species
- Diverse!



# Some differences between butterflies and moths...



# Butterflies vs. Moths



Diurnal

heat from sun



Nocturnal

Gain heat from flight

There are just a few day active moths, but no night active butterflies.

# Butterflies vs. Moths



Clubbed  
Antenna



Straight or  
feathered



# Butterflies vs. Moths

Wing position while perched or resting, when basking butterflies will hold their wings flat.



Wings  
vertical

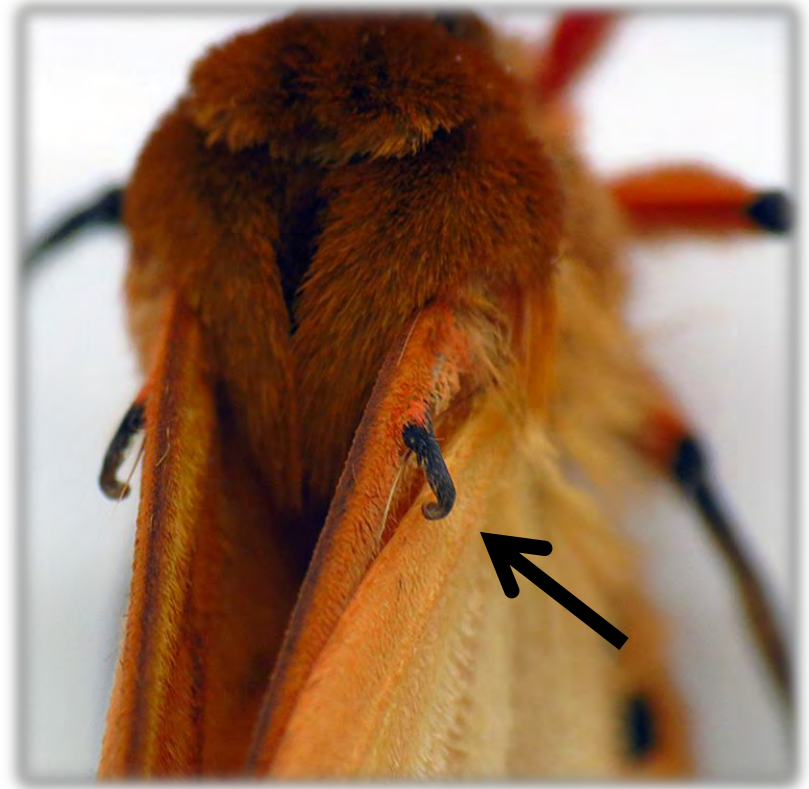


Wings  
horizontal

# Butterflies vs. Moths



No wing  
hooks



Frenaculum

This makes moths really bad fliers, no wonder they fly into porch lights!

# Butterflies vs. Moths



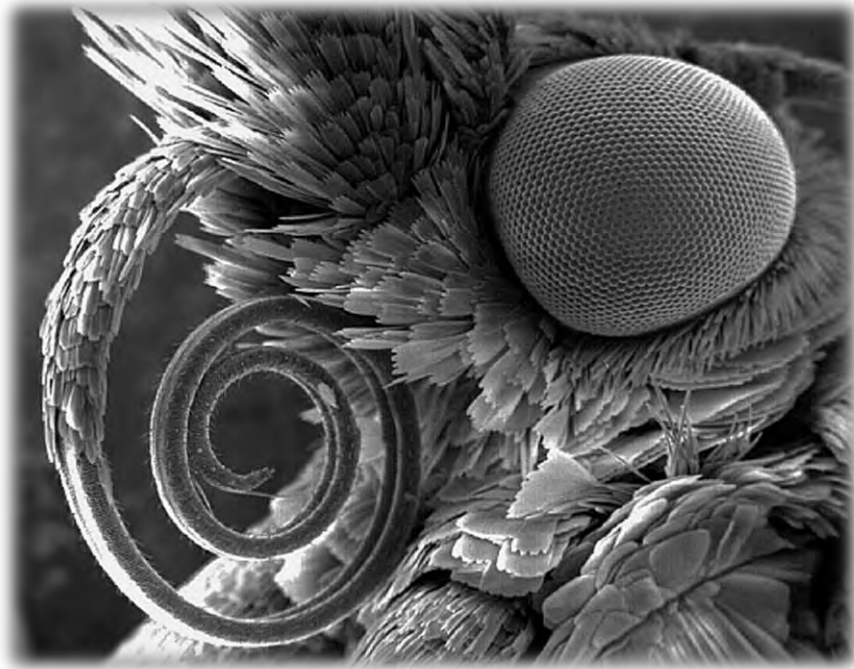
Body with  
few hairs



Hairy body



# Butterflies vs. Moths



Feed with  
proboscis

Most feed  
only as larva





# Butterflies vs. Moths



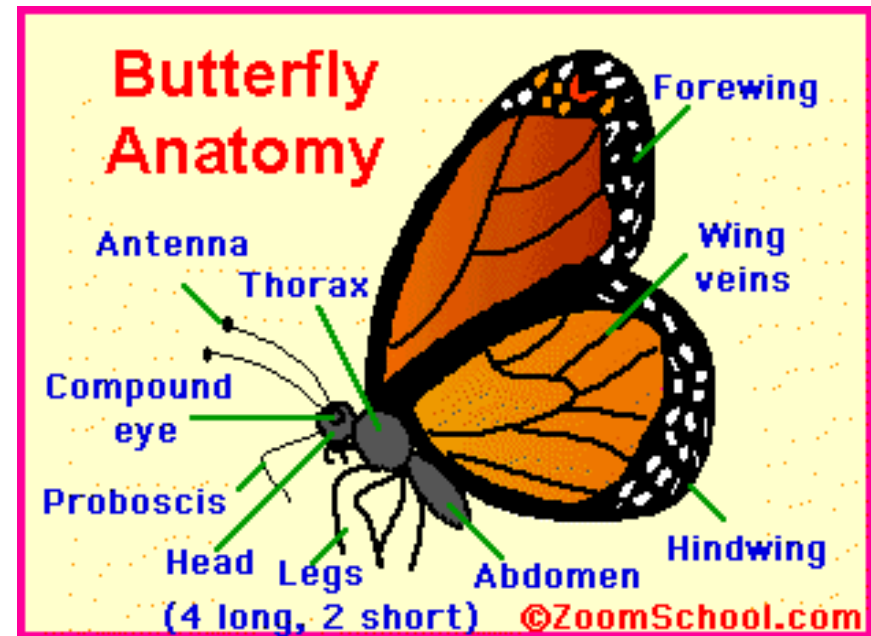
Chrysalis



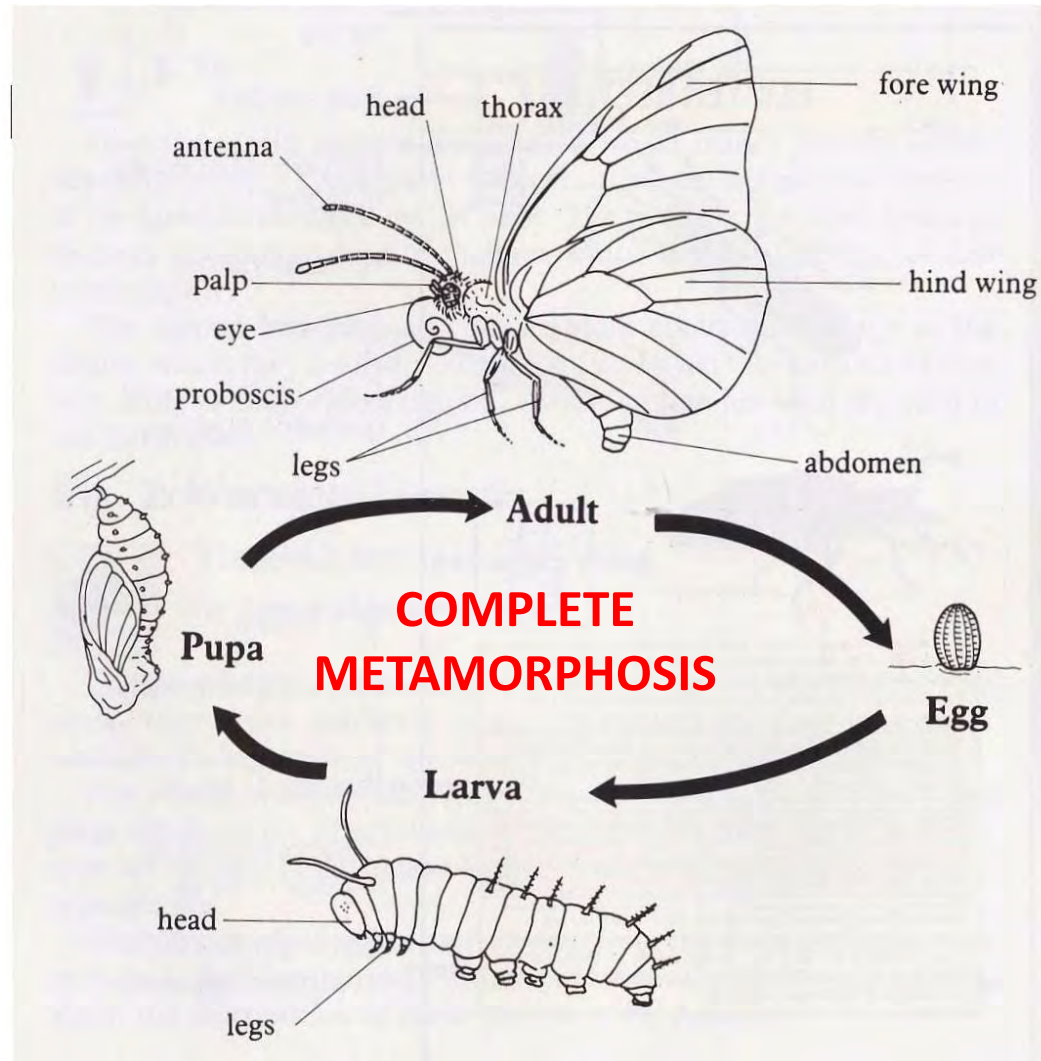
Cocoon

# Lepidoptera anatomy

- Head with eyes, antenna and proboscis
- Thorax with three pairs of legs and two pairs of wings
- Abdomen with reproductive organs
- Taste buds on feet

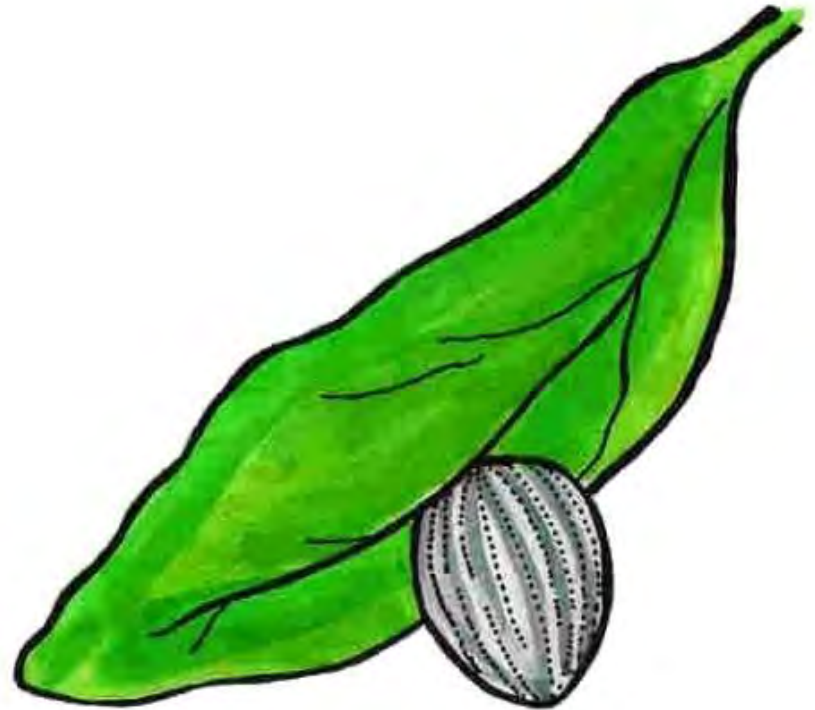


# Lepidoptera life cycle



# Egg laying

- Mated female [lays](#) [eggs](#) on specific caterpillar foodplants
- Some lay one egg per plant or egg masses
- Eggs vary by family
- Butterflies lay from a few dozen to a few thousand eggs (average = 100)





# Larval stage - Caterpillar

- [Eggs hatch](#) in less than one week
- In 2-3 weeks the feeding caterpillar sheds skin 3-4 times
- Most do not survive
- Identification difficult
- EAT, EAT and avoid being eaten



# Pupal stage

## chrysalis or cocoon

- After reaching full size caterpillar attaches and [forms a chrysalis](#)
- Moths will spin a silken cocoon around their bodies
- Tissues and structures break down and are replaced with adult structure (imaginal cells)
- Hatch in one to two weeks, a few months and sometimes over winter.



# Adult Emergence

- When adult is fully formed the chrysalis splits open
- Adult pumps fluid through its wings to extend and set them
- Once it emerges it will grow no larger
- Males emerge earlier



# Courtship

- Males patrol or perch in territories
- Some fly to female to [mate](#) if receptive
- Some fan wings to dispense pheromones
- Some engage in upward spiraling mating [flights](#)
- Spermatophore is transferred from male to female





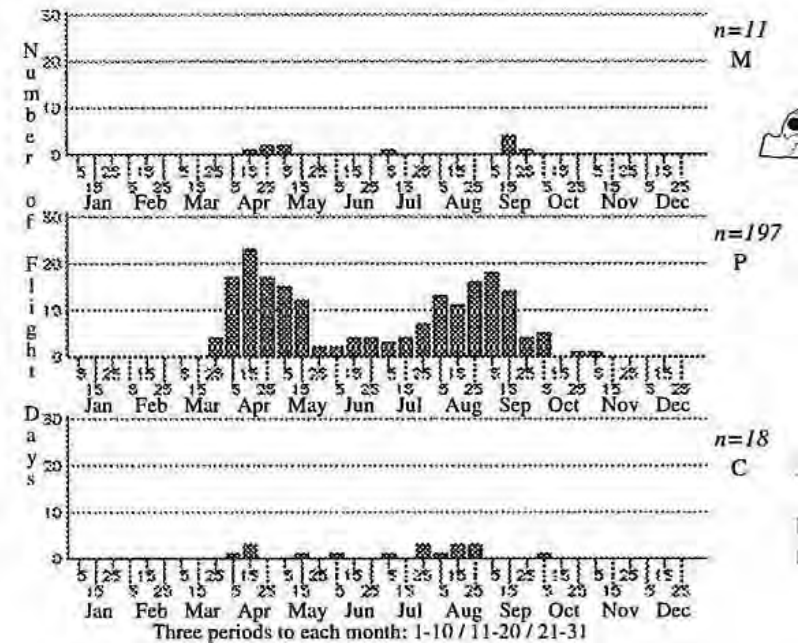
# Life spans

- Most adults live for one to two weeks
- Some as short as a week
- Migratory species up to eight months
- Many are taken by predators
- Butterflies usually live longer than moths



# Broods

- Lepidoptera complete 1-5 life cycles, or broods each year
- Some are in spring or fall only
- Many broods overlap so you can see fresh and worn individuals
- Last broods eggs overwinter



Flight chart from Butterflies of  
North Carolina [website](#)

# Colors and patterns

- Wings are covered by pigmented scales
- Most are sexually dimorphic, males inseparable from females
- Multiple brooded species vary seasonally in color or pattern
- Coloration helps attract mates, scare predators or act as camouflage.



# Size

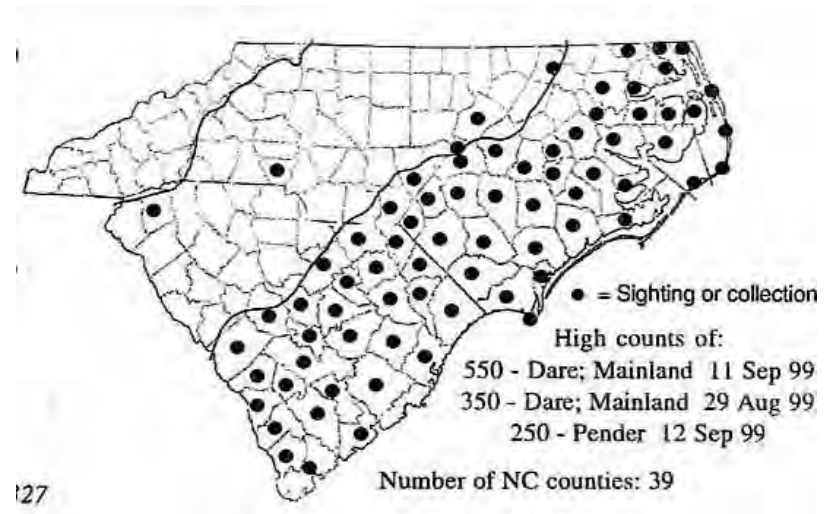
- Females tend to be larger than males
- Spring and fall broods sometimes smaller in size than summer broods
- Sizes range from ½ inch to 5 inches
- Size is determined by caterpillar growth, so foodplants are important!





# Distribution

- Temperature extremes
- Caterpillar food plant
- And/or adult nectar sources
- Can change over time
- Many endemic species
- Venus fly trap moth found nowhere else in the world!



**Range Map from Butterflies of  
North Carolina [website](#)**

# Behavior - feeding

- Adult butterflies feed with a [proboscis](#)
- Used as a straw to drink nectar
- Some have different length proboscis
- Certain flowers attract more [species](#)



# Behavior - Basking

- Gain heat from sun
- Cold blooded
- Dorsal basking on flat surfaces
- Lateral basking on leaves or other perches



# Behavior - Hilltopping

- Butterfly singles bar
- Males perch and wait or patrol for females
- Unmated females visit the area
- Open hill tops with steep sides are best





# Behavior – puddling, etc

- Butterflies congregate at mud [puddles](#) to imbibe salts
- They can also imbibe sweat from humans
- Scat and roadkill provide some nutrients
- Emperors & Snouts



# Moth behavior - lights

- Moths are attracted to a wide variety of lights
- They use the moon to navigate and are confused by man made light sources
- Ultraviolet or UV light will bring in many species
- “like a moth to a flame”



# How to identify Lepidoptera



- ID to family level
- Consider time of year
- Consider habitat type
- Consider what plants are they associating with
- Familiarize yourself with photos
- Remember appearances change and variation occurs
- If questionable about ID use more than one field mark



# How to find Lepidoptera

- Location!
- Open areas with natural vegetation
- Search power lines, fields, roads, etc
- Timing is important
- Bring a friend





# Concentrators

- Flowers (gardens)
- Hilltops
- Mud puddles
- Trails and dirt roads that are open and sunny
- Caterpillar food plants
- Regular light sources



# Lepidoptera migration

- Most species disperse
- A lot of species migrate
- Northern breeders often fly south for winter
- Spring & fall migrations viewable



# Conservation of Butterflies



## Butterfly Conservation

Saving butterflies, moths and their habitats

# Conservation: habitat destruction

- Most common cause of decline
- Wetlands drained, woodlots cut and fields are developed
- Open areas are reverting into woods
- Fire is needed, streams and natural habitats must be kept natural!





# Conservation: spraying pesticides

- Spraying for Gypsy moths and mosquitoes result in HUGE lepidoptera die offs
- Spraying also increases cancer in humans
- Natural and less toxic controls do exist



# Conservation: global warming

- Global warming has caused some butterflies to shift ranges to cooler climates
- Edith's Checkerspot
- First direct biological consequence



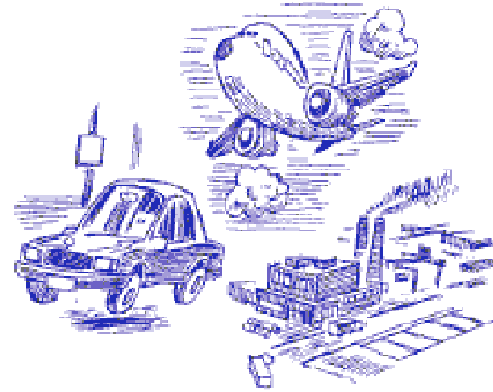
# Conservation: landowner use

- Military maneuvers on known butterfly colonies have been detrimental
- Forest Service also needs to be made aware of colonies of rare butterflies



# Conservation: other factors

- Over collecting
- Pollution
- Urban Sprawl (habitat destruction)
- Butterfly releases – there's no need, they're already free!



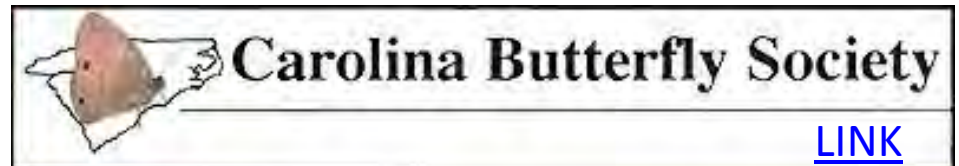


# What can we do?

- Help with NABA butterfly counts
- Monarch Programs
- Join local butterfly clubs to learn more
- Plant a native butterfly garden
- Spread the word!



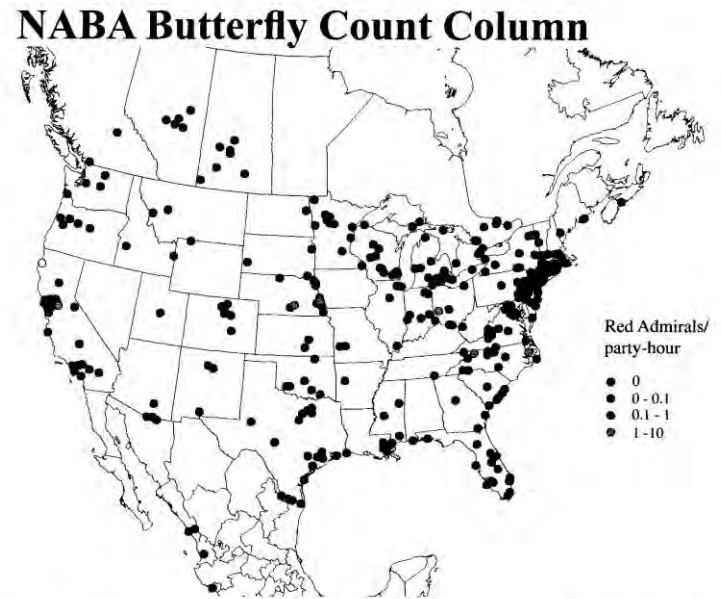
[LINK](#)



[LINK](#)

# NABA Butterfly Counts

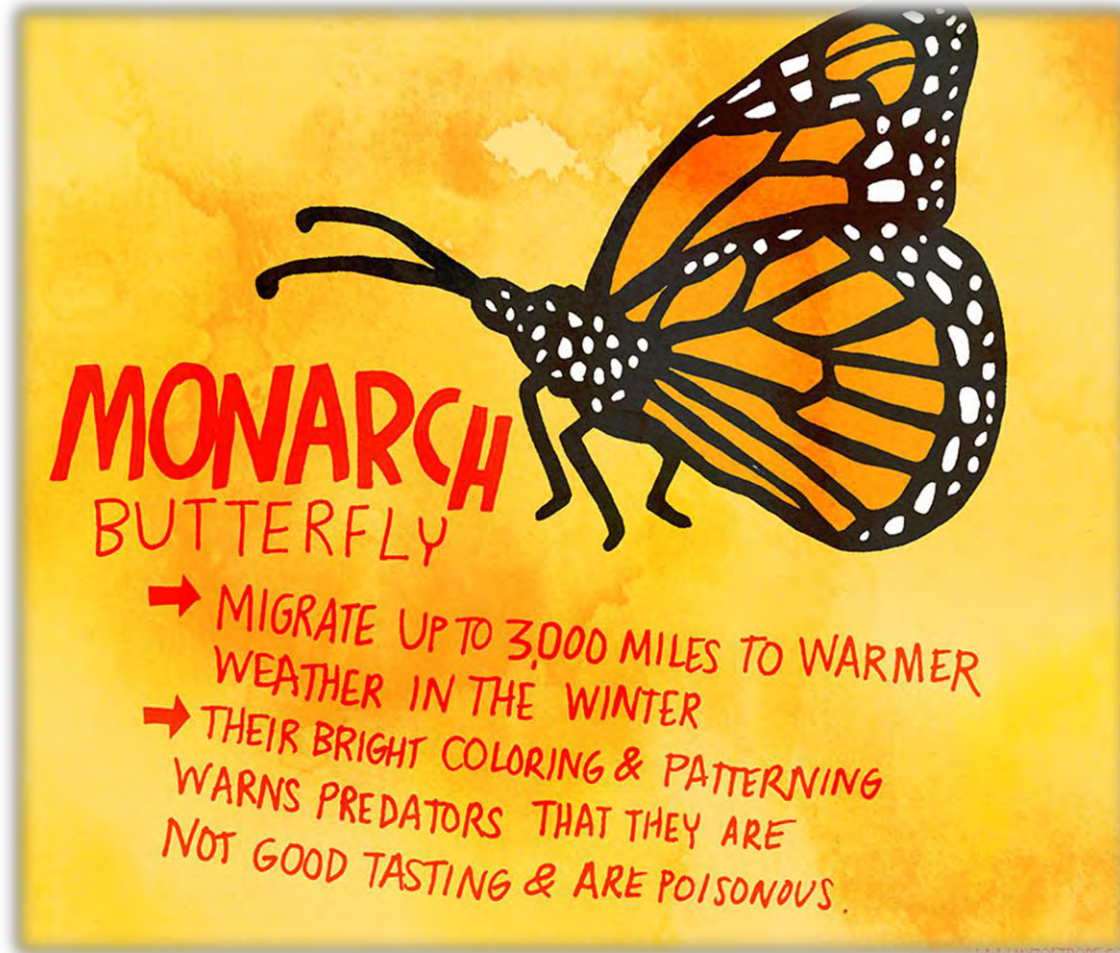
- Performed in 15 mile diameter count circles
- All day census of butterflies
- Held during warmest months of year
- Some include Dragonflies



**RED ADMIRALS: BUST IN 1996!**

*by Ann Swengel*

# Monarch Programs





## *Monarch Larva Monitoring Project*

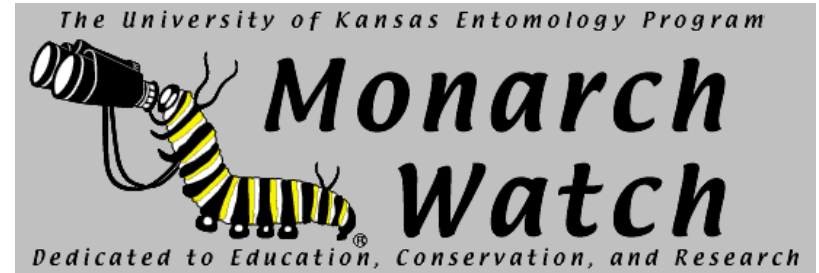
- North American Study
- Determine Monarch Density in Milkweed patches
- Optional parasitism study
- [MLMP.ORG](http://MLMP.ORG)





# Monarch Watch

- [Tag monarchs](#) in fall as they are migrating to Mexico
- 1,728 miles!
- Monarchwatch.org
- Tags recovered during winter and spring
- Low cost
- Great for volunteers
- [Monarchwatch.org](#)



# Project MonarchHealth



Oe parasite: *Ophryocystis elektroscirrha*

A co-evolved parasite that is transferred like an STD. [Monarchparasites.org](http://Monarchparasites.org)





# MONARCH WAYSTATIONS

CREATE, CONSERVE, & PROTECT MONARCH HABITATS

[www.MonarchWatch.org](http://www.MonarchWatch.org)





# Lepidoptera Gardening

- Plant NATIVE species of nectar sources only
- Proximity to natural habitats
- Plant caterpillar food plants and expect them to get eaten!!!
- Diversify!
- Butterflies in your Backyard [PDF](#)





# Lepidoptera Gardening

- Basking stones
- Damp areas or wet sandy spots
- Artificial nectar
- Butterfly boxes – DO NOT WORK
- Let it grow, WEEDS are beneficial to butterflies and other wildlife

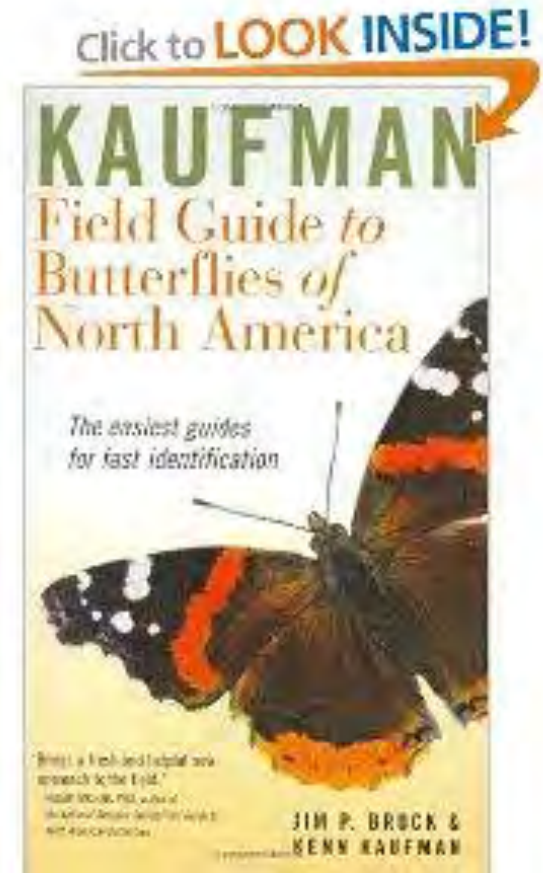
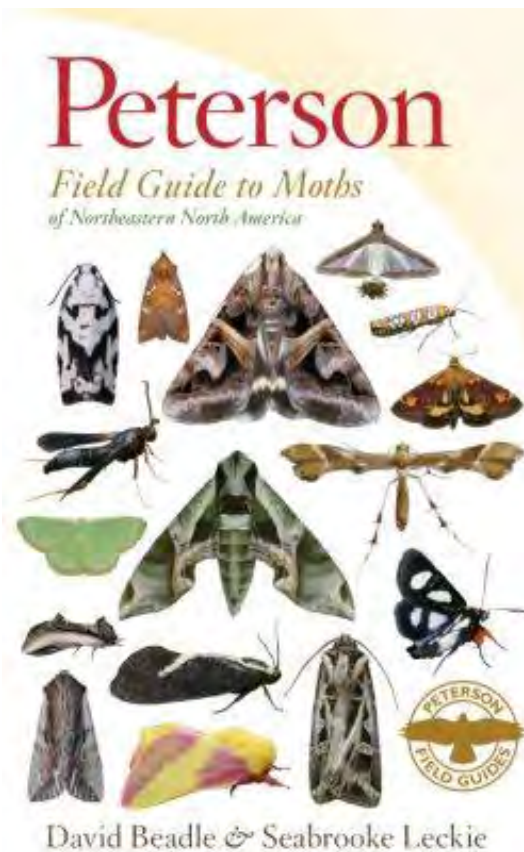
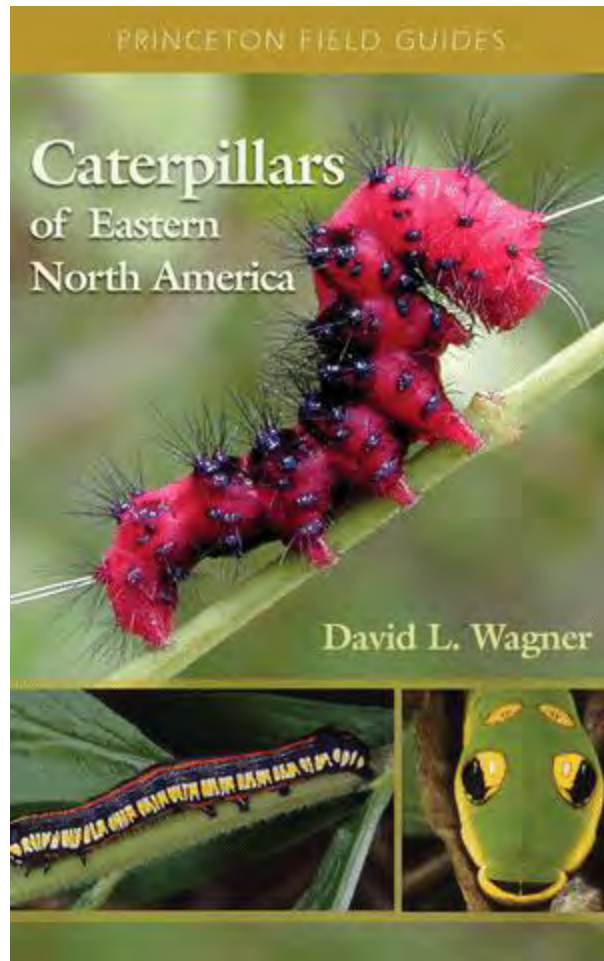


# The State Butterfly of NC

- Seen in every county in NC
- Large and recognizable with black and yellow “tiger” stripes
- Puddles regularly
- Host plant is Tulip Poplar!

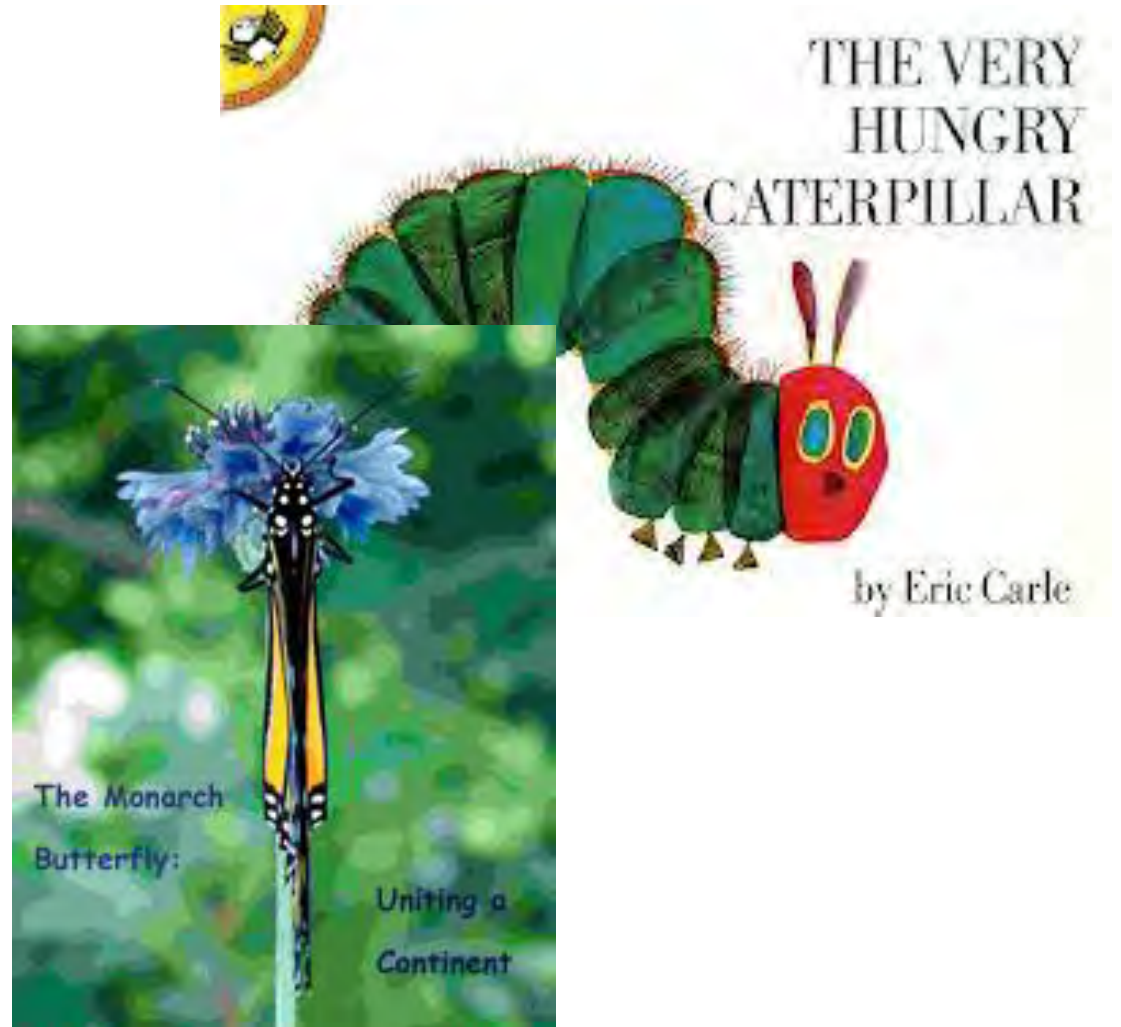
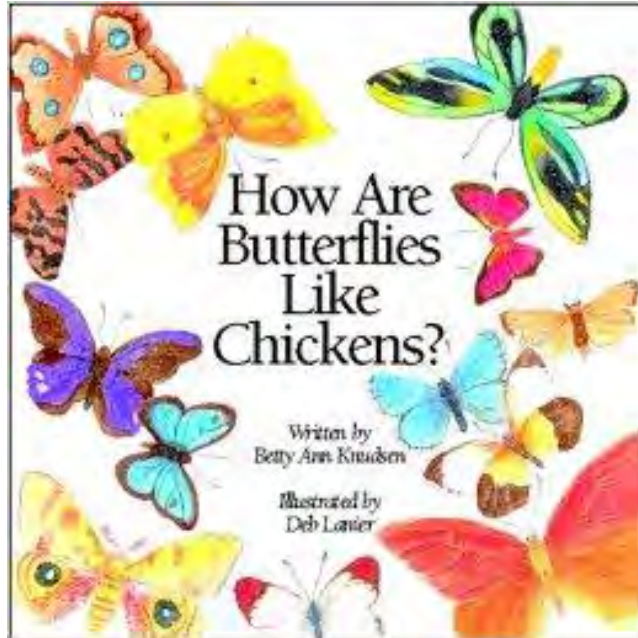


# Lepidoptera Resources





# Lepidoptera Resources





- **What does a caterpillar do on New Years Day ?**



**It turns over a new leaf!**